ON THE REGENERATION OF THE DISTAL STRUCTURES OF THE HYDRANTH OF A HYDROZOAN, STAURIDIOSARSIA SP

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ON THE REGENERATION OF THE DISTAL STRUCTURES OF THE HYDRANTH OF A HYDROZOAN, *STAURIDIOSARSIA* SP[1)]

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The regeneration of the hydranth of *Stauridiosarsia* sp. isolated of the proximal part was described in the previous paper (Kakinuma 1965a). In that study, the operated hydranth which was given food showed a phenomena different from the results of Nakamura (1940) and othors in the regeneration of the hydranth of *Stauridiosarsia* sp. In this case of the isolated proximal part of the hydranth, the isolated distal part with feeding regenerated the lost part of the proximal structures of the hydranth without regenerating the stolon directly.

In this paper, the results of the experimental observations on the regeneration of the operated hydranth which lost the distal structures are reported.

Here the writer thanks Dr. Eturô Hirai, the Directer of the Marine Biological Station of Asamushi, for his surpervision during the course of this investigation.

MATERIAL AND METHOD

The material used in this investigation was *Stauridiosarsia* sp. which had been cultivated with the larvae of *Artemia salina* in the laboratory. Attempts were made with some polyps to isolate the hydranth on the polyps of a younger colony. The distal structures were isolated from the polyps which were not separated from the parent colony and kept in connection with the colony. Each hydranths were operated under the oral whole of the capitate tentacles or upper part of the secondary whorl of the capitate tentacle, and the regeneration of the operated hydranths which lost the distal structures was observed. These regenerations were observed on the cases of the proximal parts of hydranths which were given food and on those without the food of *Artemia salina* larvae after the operation.

OBSERVATION

The hydranth of *Stauridiosarsia* sp. are slender and club-shaped, one to two millimeters in length, and have two kinds of tentacles, one is the capitate tentacle

1) Contributions from the Marine Biological Station of Asamushi, Aomori Ken, No. 322.

and the other is the filfiorm tentacle. The capitate tentacles are about 12–18 in number and arranged on the whorls about in three verticils typically, though their arrangment become somewhat irregular in the aged colony. Each whorls have four to five tentacles, and the nematocysts knobs are smaller towards the under whorls (Fig. 1).

Observation on the regeneration of the lost distal structures of the hydranth with or without food after the operation was made.

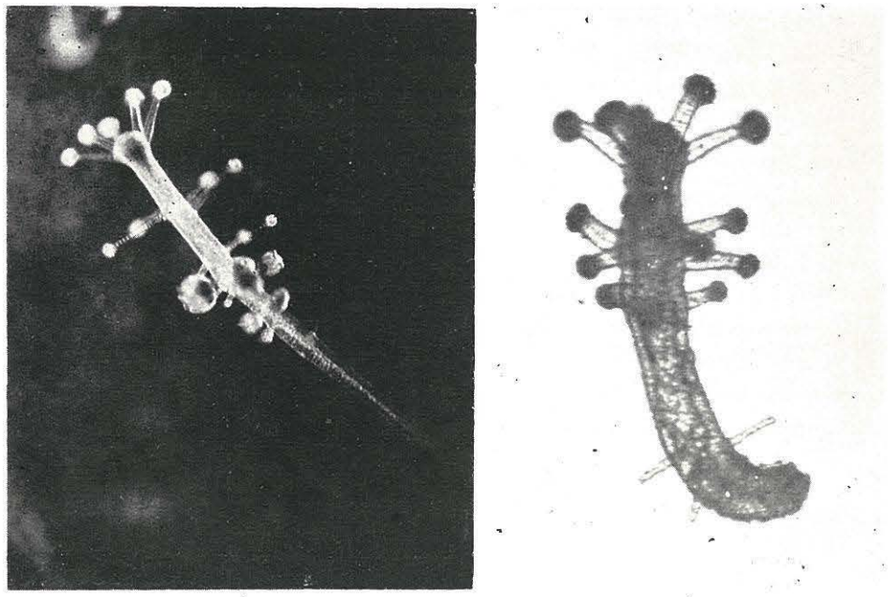

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Fig. 1. The hydranths of *Stauridiosarsia* sp.
1. Showing arrangment of capitate tentacles with medusa bud.
2. Showing the proximal filiform tentacles.

I. Regeneration of the hydranth without food.

The hydranth was isolated under the first or oral whorl, at the upper part of the secondary whorl of the capitate tentacles. In this case, no food was supplied after the operation, and the sea water for the proximal hydranth which lost the distal part in the petri-dish was changed every day until the end of the observation. The cut end closed up about an hour after the operation (Fig. 2, 1). On the second day, the cut end showed swelling. Its swollen part became a flat hypostome when compared with the normal hydranth (Fig. 2, 2). On the third day, all the tentacles began to degenerate, and shrunk strikingly within half a day (Fig. 2, 3). On the fourth day, the hydranth degenerated leaving the proximal part which was shrunk

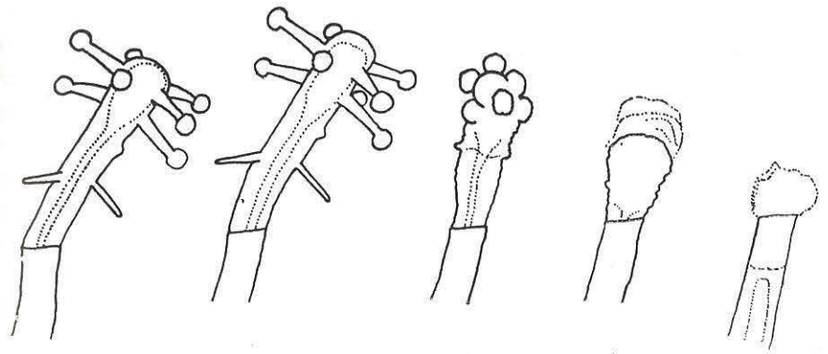

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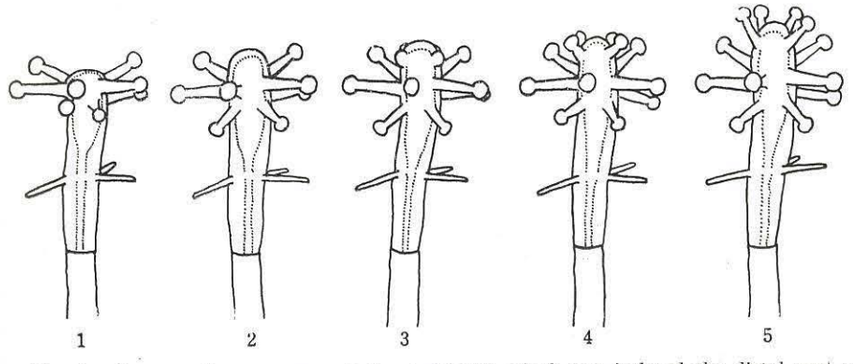
Fig. 2. Regenerating process of the hydranth which was isolated the distal part of *Stauridiosarsia* sp. whihout food after the operation.
1. A hydranth with the cut end closed up.
2. Development of a flat hypostome of the hydranth.
3. A hydranth began to degenerate.
4. A hydranth degenerated leaving a remnant.
5. A hydranth was absorped to hydrocaulus completely.

as a mass (Fig. 2, 4). On the fifth day, the hydranth was absorbed to the hydrocaulus completely, but there were still remaining some transparent remnant with wrinkled thin menbrane (Fig. 2, 5).

II. Regeneration of the hydranth with food supplied.

The hydranth was isolated under the first or oral whorl of the capitate ten-



1 2 3 4 5

Fig. 3. Regenerating process of the hydranth which was isolated the distal part of *Stauridiosarsia* sp. with food supplied after the operation.
1. A hydranth with the cut end closed up.
2. Development of a hypostome of the hydranth.
3. The short tentacles were produced from the rudiment.
4. Appearance of the rudiment of tentacles.
5. The tentacles were formed nearly completely.

tacles, or the upper part of the secondary whorl of the capitate tentacles of hydranth. And the proximal part of the hydranth which lost the distal structure was supplied with sufficient food and the sea water in the petri-dish was changed every day until the end of the observation. The cut end closed up about an hour after the operation (Fig. 3, 1). The proximal part of the hydranth could take food about six hours after the operation. On the second day, the cut end of the hydranth became somewhat swollen at the lost part, and a hypostome was produced (Fig. 3, 2). On the third day, the rudiments of the tentacle, four in number appeared around and near the mouth. At first, the newly formed tentacles appeared as nematocysts knobs (Fig. 3, 3). On the fourth day, their rudiments showed the short capitate tentacles (Fig. 3, 4). On the seventh day, they became nearly complete capitate tentacles, though they were shorter and slender, with smaller nematocysts knobs when compared with the initial capitate tentacles (Fig. 3, 5).

DISCUSSION

In the present experiment, writer observed that the regeneration of the hydranth which lost the distal structure showed results the same as in the previous study. That is, when the operated hydranth was cultured with food, it is never absorbed in rgeneration to the hydrorhiza directly, and the hydranth completely recovered the lost part. Adcording to Nakamura (1940) and others, the polyp and hydrorhiza constitute a whole; the cell material is readily inter-changeable from one to another within the whole. But, when the operated hydranth was cultured with sufficient food, the hydranth did not change to the hydrorhiza directly but recovered the lost structures of the hydranth nearly completely. In these experimental investigation, it was supposed that the structures of the hydranth of *Stauridiosarsia* sp. indicated more determined ability than the mode of regeneration which had been supported for some hydrozoans from the time of Levinsen (1893) to Nakamura (1940).

SUMMARY

Observations were made on the regeneration of the lost distal structures of the hydranth of *Stauridiosarsia* sp. which was isolated of its distal part, in the cases without or with food supplied after the operation. In the regeneration of the operated hydranth without food after the operation, the hydranth was degenerated and became absorped to the hydrorhiza completely. But in the case of the regeneration of the operated hydranth supplied with food after the operation, the hydranth never became absorbed but nearly completely recovered the lost structures.

LITERATURE CITED

TOYOMASU, K., 1938. Observation on the regeneration in *Hydractinia epiconcha* Stechow and *Hydrocoryne miurensis* Stechow. Botany and Zoology., 6 (Japanese).

NAKAMURA, N., 1940. Observations on the regeneration in *Syncoryne nipponica*. Annot. Zool. Japon., **19**: 255–261.

KAKINUMA, Y., 1960a. Differentiation of an isolated piece of an hydrozoan, *Coryne uchidai*. Bull. Mar. Biol. Stat. Asamushi., **10**: 31–36.

———., 1965a. On the regeneration of the proximal structures of hydranth of a hydrozoan, *Stauridosarsia* sp. Bull. Mar. Biol. Stat. Asamushi., **12**: 63-68.